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January 31, 2002

Ms. Magalie Salas, Secretary  
Federal Communications Commission  
445 12th Street SW  
Washington DC 20554

**Re: ET Docket No. 98-153 -- Revision of Part 15 of the Commission's Rules Regarding  
Ultra-Wideband Transmission Systems  
*Ex Parte Communication***

Dear Ms. Salas:

Pursuant to Section 1.1206(a)(2) of the Commission's Rules, on behalf of XtremeSpectrum, Inc., I am filing this letter electronically to report an oral ex parte communication in the above-referenced proceeding.<sup>1</sup>

Yesterday, Martin Rofheart of XtremeSpectrum, Inc., Michele Farquhar, Esq., of Hogan & Hartson, L.L.P., and I met with James D. Schlichting, William D. Lane, and Joel D. Taubenblatt of the Wireless Telecommunications Bureau.

After discussing XtremeSpectrum's technology and applications in general terms, we focused on explaining why UWB operating in accordance with XtremeSpectrum's proposed rules (see attached Appendix) does not interfere with PCS or E-911. Our presentation relied on XtremeSpectrum's filings of January 3 (PCS), January 23 (E-911), and January 28 (response to wireless companies), as well as the attached materials.

In a separate, more technical conversation, Martin Rofheart responded to questions from Dr. Lane about XtremeSpectrum's waveform and modulation.

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<sup>1</sup> XtremeSpectrum, with 67 employees, conducts research in ultra-wideband communications systems as its sole business. XtremeSpectrum intends to become a ultra-wideband communications manufacturer once the Commission authorizes certification of such systems. XtremeSpectrum takes no position on ultra-wideband radar applications.

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If there are questions about this submission, please call me at the number above.

Respectfully submitted,

Mitchell Lazarus  
Counsel for XtremeSpectrum, Inc.

cc: Meeting participants

## APPENDIX -- Proposed Rule Text

### 15.\_\_\_\_ Protection of other services.

(a) An ultra-wideband communications device may not be mounted on an outdoor surface or support.

(b)(i) Under no circumstances may the emissions from an ultra-wideband communications device exceed these limits:

Frequency (MHz)	Field strength (microvolts/meter)	<i>[NOTE IN DRAFT]</i>
960-1574.92	125	<i>[Class B - 12 dB]</i>
1574.92-1575.92	45	<i>[Class B - 21 dB]</i>
1575.92-1990	125	<i>[Class B - 12 dB]</i>
above 1990	500	<i>[Class B]</i>

(ii) In the table above, the measurement distance is 3 meters. The tighter limit applies at band edges. Measurements shall be performed using a resolution bandwidth of 1 MHz.

(iii) In addition to the provisions of paragraph (b)(i), emissions limits in the band 1574.92-1575.92 MHz measured using a resolution bandwidth of 10 kHz shall not exceed 15 microvolts/meter measured at 3 meters. *[NOTE IN DRAFT: This represents a 10 dB additional attenuation for spectral lines in the GPS band.]*

(c) The provisions of this subsection apply to a battery-powered ultra-wideband device in communication with another battery-powered ultra-wideband device.

(i) The following emissions limits apply in lieu of those set out in section (b):

Frequency (MHz)	Field strength (microvolts/meter)	<i>[NOTE IN DRAFT]</i>
960-1610	10	<i>[Class B - 34 dB]</i>
1610-3100	80	<i>[Class B - 16 dB]</i>
3100-4200	160	<i>[Class B - 10 dB]</i>
above 4200	500	<i>[Class B]</i>

(ii) A battery-powered ultra-wideband device must be designed so that it cannot commence communicating with another battery-powered ultra-wideband device unless the user affirmatively initiates the transmission, as by pressing a button.

(iii) As an alternative to compliance with paragraphs (i) and (ii), a battery-powered ultra-wideband device can be made incapable of communicating with another battery-powered ultra-wideband device outdoors.

*[NOTE IN DRAFT: The last provision allows "full power" peer-to-peer operation where the device can establish it is indoors -- e.g., by detecting a nearby AC-powered unit.]*

## ULTRA-WIDEBAND WILL NOT INTERFERE WITH GPS-BASED E-911

Qualcomm, Inc. claims ultra-wideband (UWB) will cause serious interference to GPS-based E-911 systems from 75 meters away.

In fact, the minuscule levels of UWB emissions levels -- well under a billionth of a watt, in the GPS band -- extend over a few tens of centimeters at most, and are completely safe for E911. With less permitted power in the GPS band than any other device in the FCC rules, UWB is safer than any other radio product or noise source.

**What is GPS-based E-911?** The FCC requires that wireless carriers soon be able to locate a wireless phone that dials 911, a capability called E-911. Some carriers are opting to implement E-911 by installing a GPS finder in the wireless handset.

**Why does Qualcomm think UWB will interfere?** Qualcomm reported a laboratory study that purports to show interference into an E-911 handset from a UWB device 75 meters away.

**What's wrong with the Qualcomm study?** The study rests on three wrong assumptions. With those assumptions corrected, the interference vanishes. The wrong assumptions are:

1. ***Overly high emissions levels.*** Qualcomm assumed UWB emissions in the GPS band at Part 15 levels, *which neither the NPRM nor any party supports.* XtremeSpectrum has proposed levels that are 125 to 2500 times lower. Using those numbers in Qualcomm's analysis brings the interference distances down by 98 percent or more.
2. ***Unreasonable environment.*** Qualcomm assumed the UWB emitter and GPS-equipped handset are alone in the universe, with no other sources of radio interference. In practice, however, the handset's E-911 performance will be limited not by UWB, but by the dozens of much stronger radio noise sources in the typical home or office -- including computers and copiers, DVD players and coffee makers. *In the GPS band, UWB will operate at far lower emissions levels than any other device in the FCC rules.*
3. ***Unreasonable propagation.*** Qualcomm assumed that radio waves can travel indoors for 75 meters as they would in outer space, without any obstacles or reflections. In fact, ordinary walls and furniture severely limit UWB signals.

**Conclusion:** UWB is safe for E-911 -- safer by far than computers, CD players, digital cameras, and any other device regulated by the FCC.

## **ULTRA-WIDEBAND IS SAFE FOR WIRELESS PHONES**

Contrary to PCS industry assertions, *ultra-wideband (UWB) devices will not interfere with PCS phones.*

FCC-proposed UWB power limit in the PCS band is *5 billionths* of a watt -- *far lower than any other radio device anywhere in the FCC's rules.* For example:

- Personal computers and laptops -- permitted 16 times more power than proposed UWB in the PCS band.
- Microwave ovens -- 400 times more power.
- Wireless LANs -- 2,800 times more power.
- Competing PCS companies' handsets, leaking across frequency boundaries -- 10,000 times more power than UWB!

***UWB presents a far lower interference threat to PCS than does any other device in the Commission's Rules -- i.e., none at all.***

### **A Real-Life "Natural Experiment": Hundreds of Millions of Digital Devices**

UWB is very similar to the stray radio noise from digital devices -- personal computers, laptops, PDAs, CD players, alarm clocks, etc.

The main difference between UWB and digital noise? UWB signals are far weaker. The proposed rules would limit UWB emissions to just 6% of the energy permitted for digital devices in the PCS band.

Despite hundreds of millions of digital devices in use, PCS phones work fine -- even right next to computers.

Years of experience with digital devices and PCS is persuasive evidence that UWB will not affect PCS phones.

### **PCS Industry Studies (With Needed Corrections) Show No Interference.**

The PCS industry submitted three studies that purport to show interference -- but those change the facts of both UWB and PCS beyond recognition.

Where did the PCS studies go wrong?

1. ***Wrong emissions limits.*** Most PCS studies assumed UWB emissions limits 16 times higher than the FCC (or anyone else) proposes.
2. ***Impossible numbers of UWB devices.*** The PCS studies assume up to 100,000 active UWB devices per square kilometer. That makes ten operating UWB transmitters for every man, woman, and child in metropolitan New York City -- even more elsewhere.
3. ***Alone in the universe.*** The studies assume that the UWB emitters and PCS handsets exist alone, unaffected by any other sources of radio-frequency energy. But populated areas always have a background level of radio noise from many sources -- all authorized at far higher powers than UWB. In the real world, the presence of UWB is completely negligible.
4. ***Signals in space.*** The short range of UWB (10 meters or less) makes it primarily an indoor technology. But the PCS studies assume that interfering UWB signals propagate indoors as they would in outer space. In fact, interior walls, furniture, and within-the-room reflections diminish the effect of UWB by about 95%.
5. ***Impossible aggregation.*** The PCS studies wrongly assume that signals from multiple UWB units "aggregate" to form stronger signals. UWB signals cannot aggregate, because they cannot travel far enough. The already weak signals fall off much faster than they can add up. Example: If 100,000 UWB emitters are 100 meters away from a PCS handset, their total signal would be well under 1% of the signal from *one* UWB emitter, placed 3 meters away. Only the nearest UWB emitter is significant. The other 99,999 simply don't matter.

With these five distortions corrected, the PCS analyses show *no* interference from UWB.



XtremeSpectrum

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**XtremeSpectrum**

*An Ultrawideband Technology Company*

January 30, 2002

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# Company Overview

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- Founded Q4 '98 by recognized experts in UWB technology and radar applications
  - Management team on-board, with in-depth technology and business experience in communication IC industry (design, manufacture and marketing)
  - Partners and customers include industry leaders in consumer electronics, computing and networking
  - Investors include Cisco Systems, Motorola, Texas Instruments, Alliance Technology Ventures, Granite Ventures and Novak Biddle Venture Partners.
  - First generation product development nearing completion
  - Headquartered in Vienna, VA with Silicon Valley office in Mountain View, CA
    - Product launch tied to regulatory approval
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# Market Drivers

- The world is going wireless ...



- The market for wireless devices will exceed 3B units by 2006

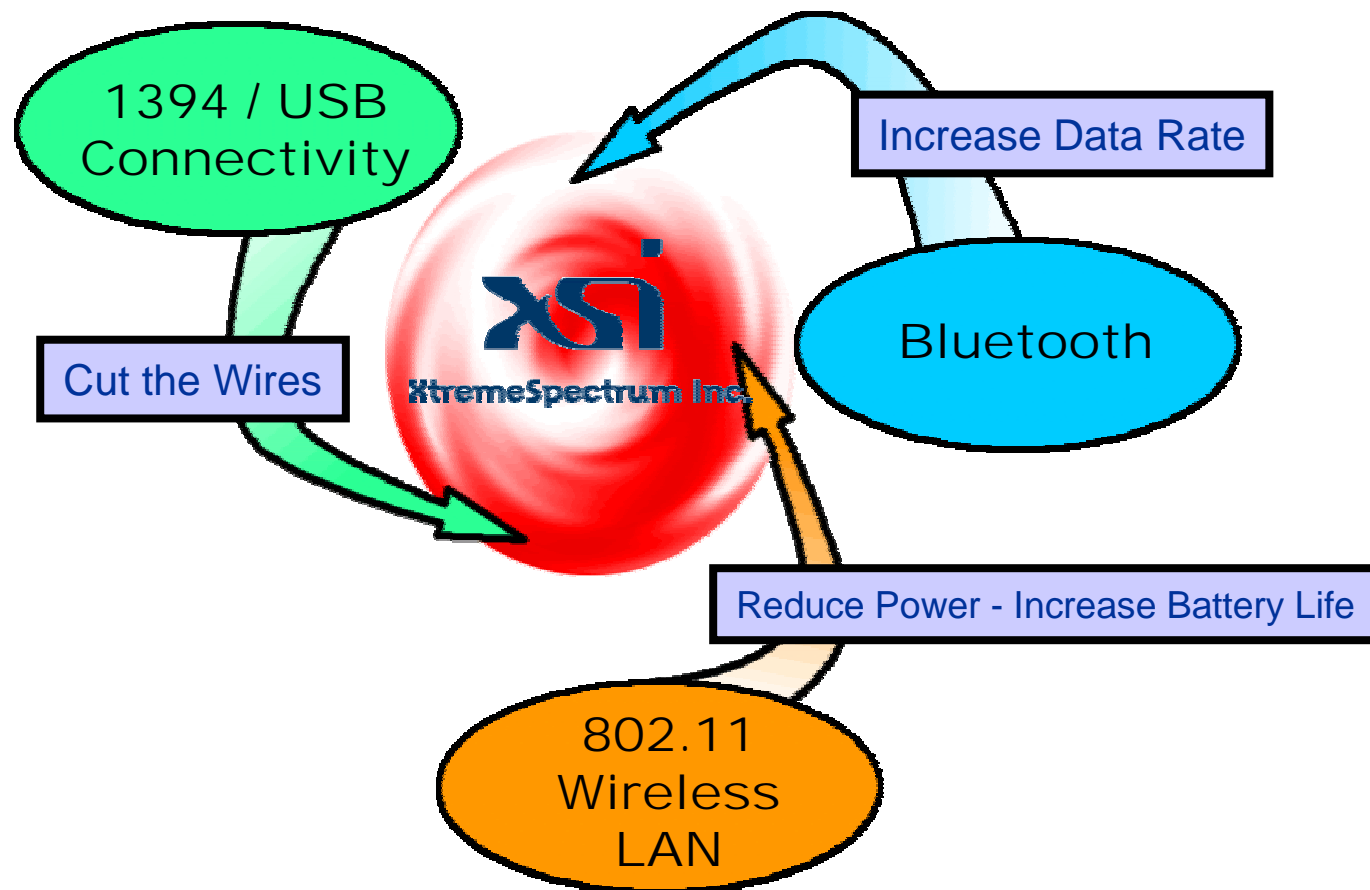


*Media Rich Handheld Devices Must Connect to the Network*

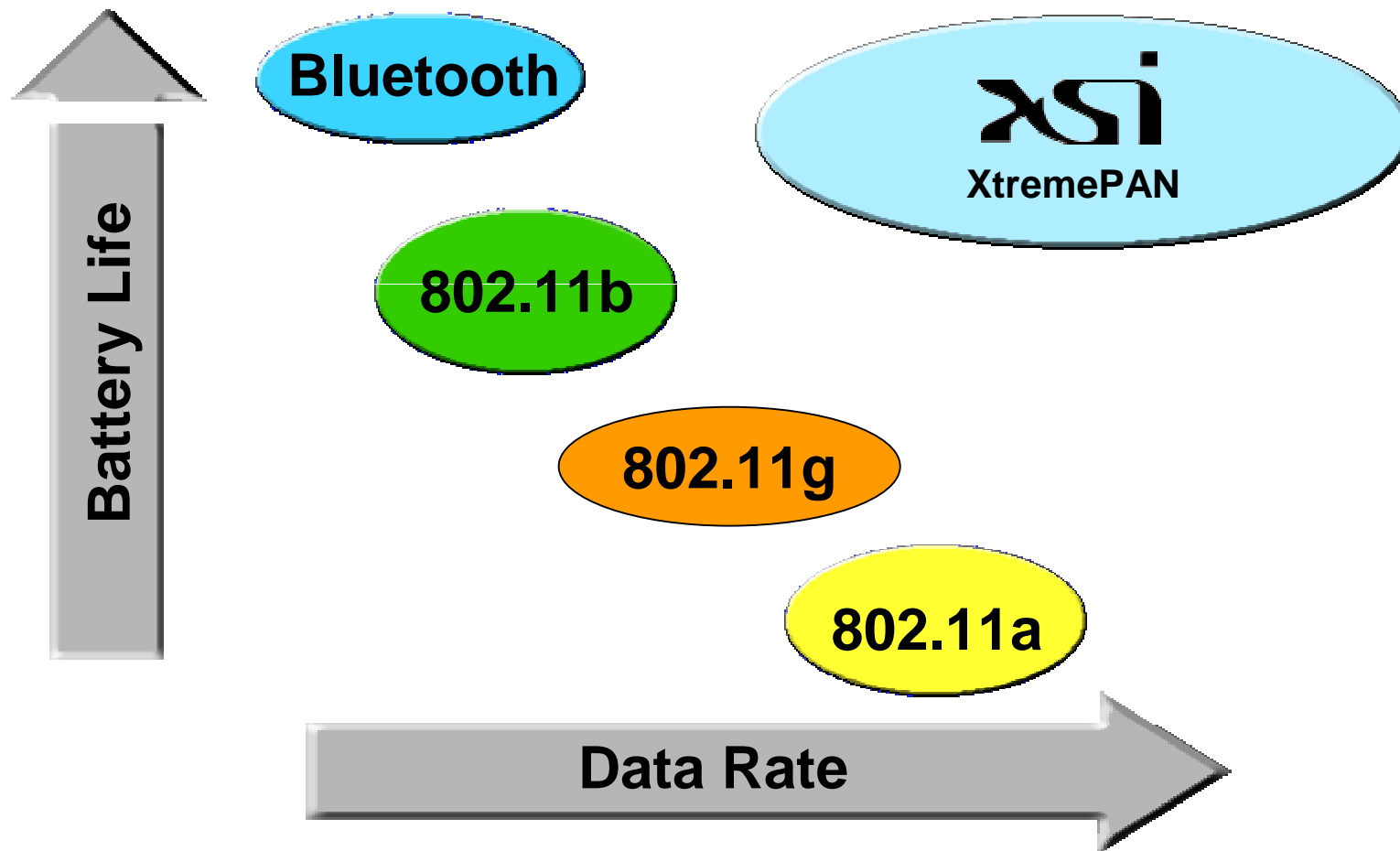
*XtremeSpectrum Simultaneously Delivers  
High Data Rate, Low Power Consumption, and  
Low Cost*



## Reducing the Performance Differences between the Wireless and Wired Worlds for Consumer Media-Intensive Devices



# *Importance in the Marketplace*

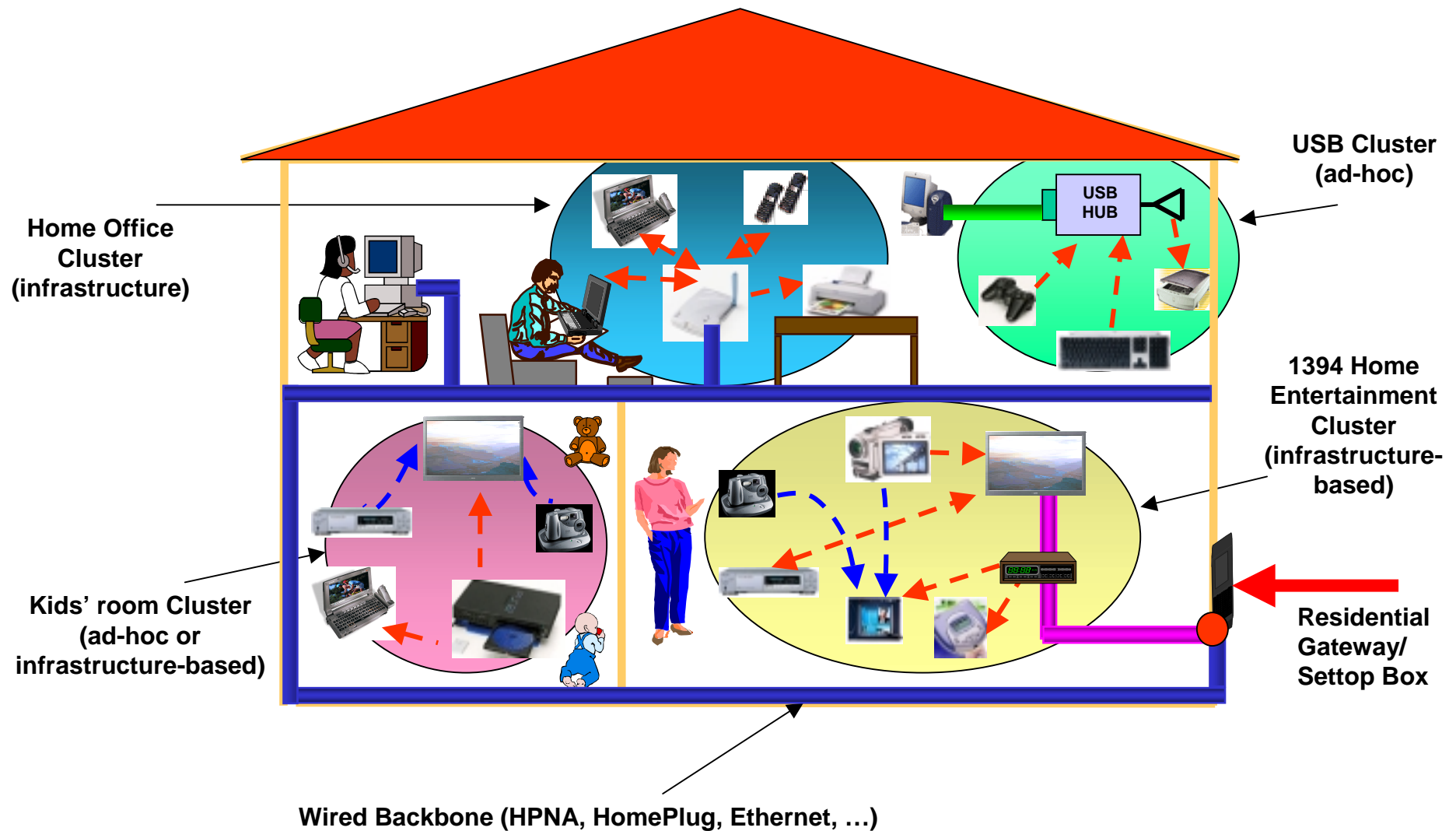


*Order of Magnitude Speed X Power Advantage*



XtremeSpectrum

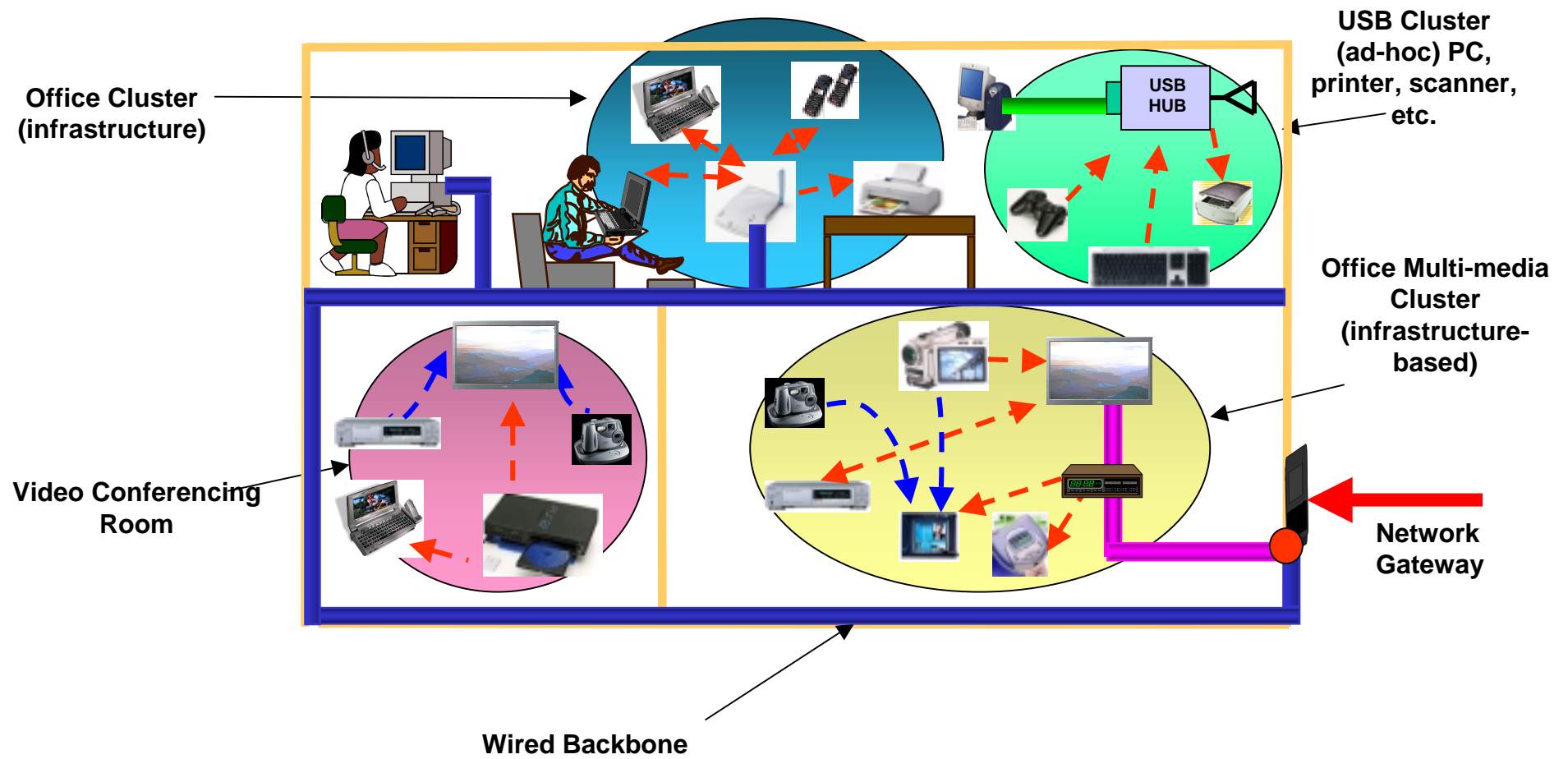
# Our Vision: The Wireless Networked Home



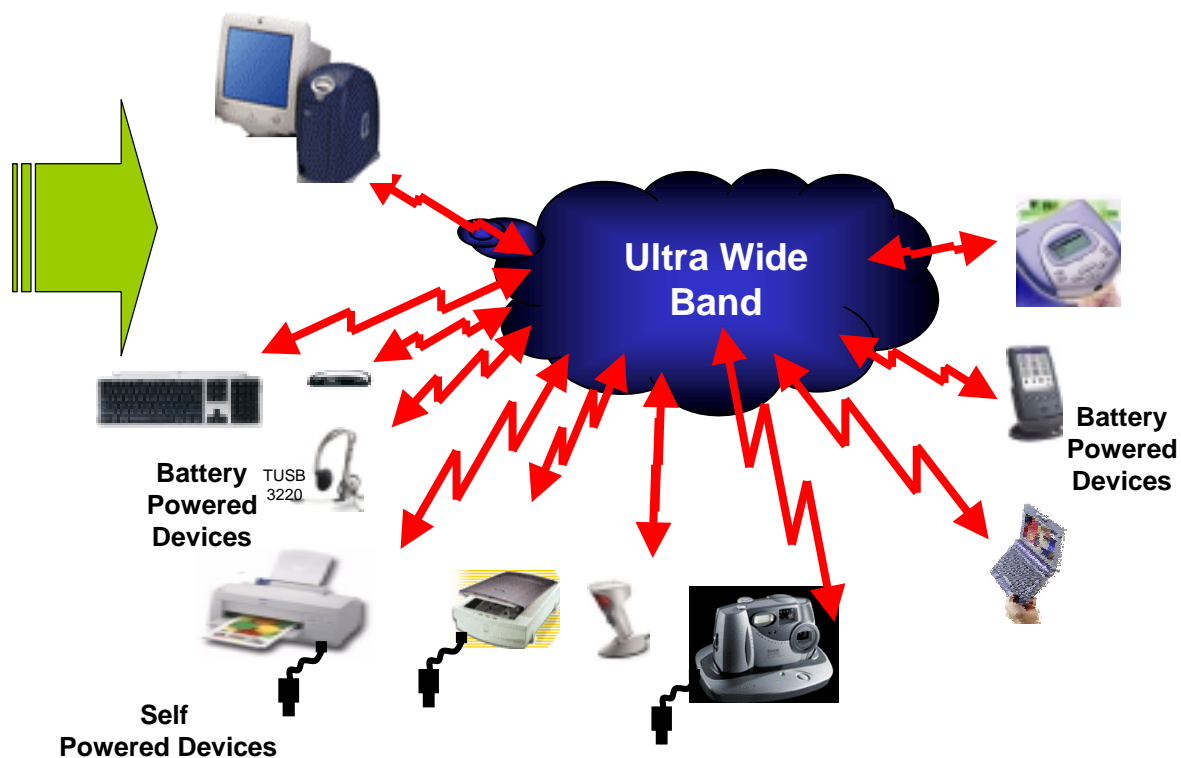


XtremeSpectrum

## Our Vision: The Wireless Office



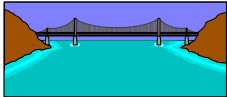
# *Applications: Reducing the Rat's Nest of Wires in the Office*



# *Applications: Transportation-Related*



- **Automotive Radars (collision avoidance and collision mitigation)**



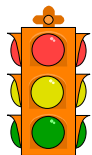
- **Infrastructure Integrity Measurement**



- **Highway Inspection, Development and Construction**



- **Airport and Transportation Facilities Security**



- **Intelligent Transportation Systems (toll booth collection, traffic warning systems)**

# *Applications: National Security & Public Safety*

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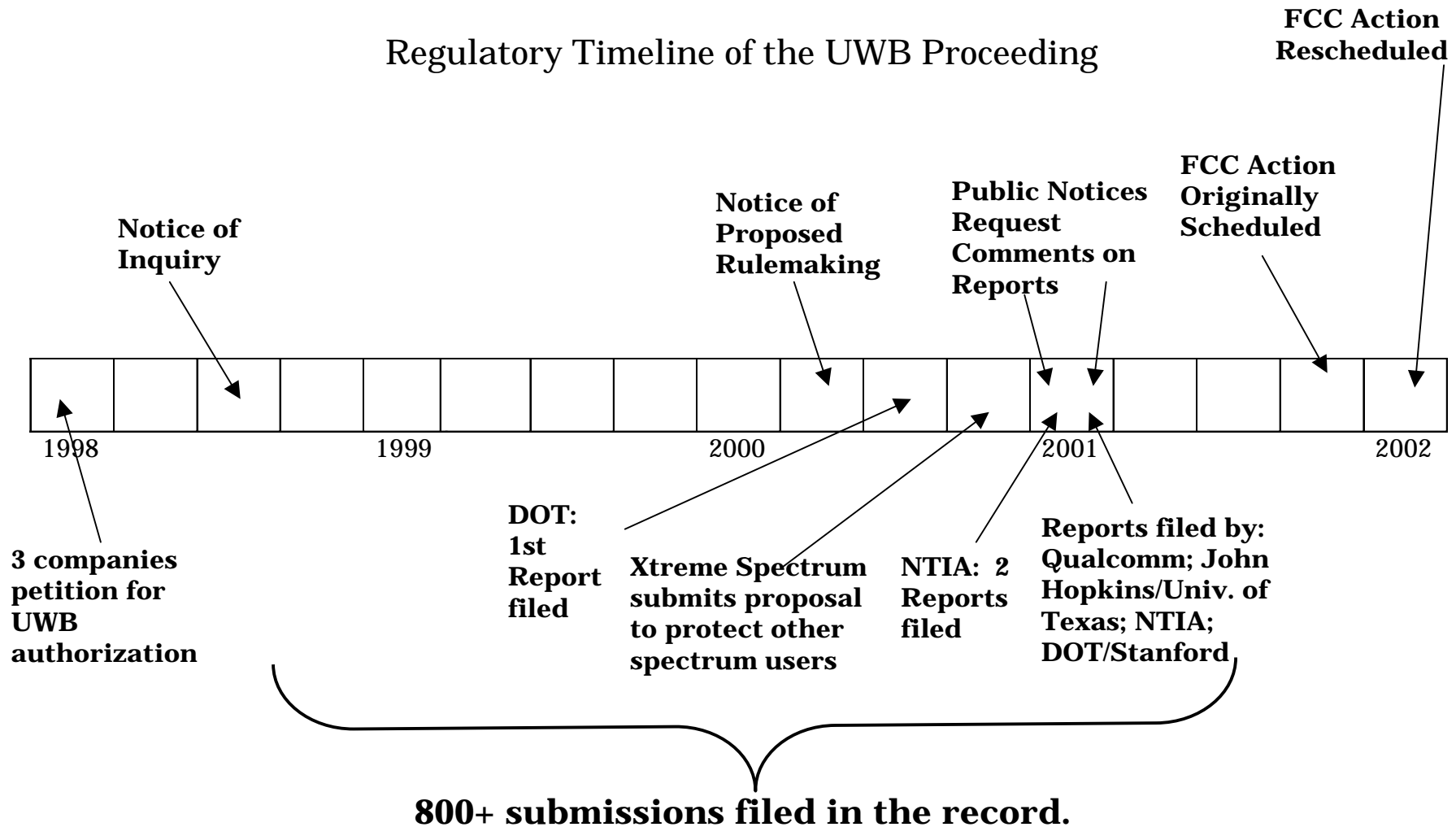
- **Military Surveillance**
  - **Port Authority Security**
  - **Police Department Equipment**
  - **Fire Department Equipment**
  - **Postal Service Security**
  - **E911 Management**
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# Regulatory Review Has Been Long and Thorough



## Regulatory Timeline of the UWB Proceeding



# *All Proposals Require Tougher UWB Limits than for other Part 15 Devices*



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## ■ **The FCC's UWB NPRM proposed:**

- to apply the "default" Class B limit to UWB operations above 2 GHz
- to require a 12 dB reduction below the Class B limit for operations below 2 GHz, where GPS, PCS and certain Government systems operate

## ■ **XtremeSpectrum has proposed even stricter limits.**

- The following slides detail these limits and additional measures proposed for certain frequency bands to ensure that UWB devices do not cause harmful interference.

## ■ **The strictest limits are proposed for "peer-to-peer" operations.**

- "Peer-to-peer" refers to communications taking place between two battery-powered UWB devices.
- Tighter limits are appropriate for peer-to-peer operations because they can occur outside, where signals may not be blunted by the presence of walls and furniture.

# *RULES*

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- **Set appropriate emission limits**
- **Ban outdoor infrastructure**
- **Don't restrict peer to peer**
- **Give manufacturers multiple regulatory options to maximize flexibility to innovate while protecting existing spectrum users**
- **XtremeSpectrum will comply with any reasonable set of limits that protects GPS**



# GPS

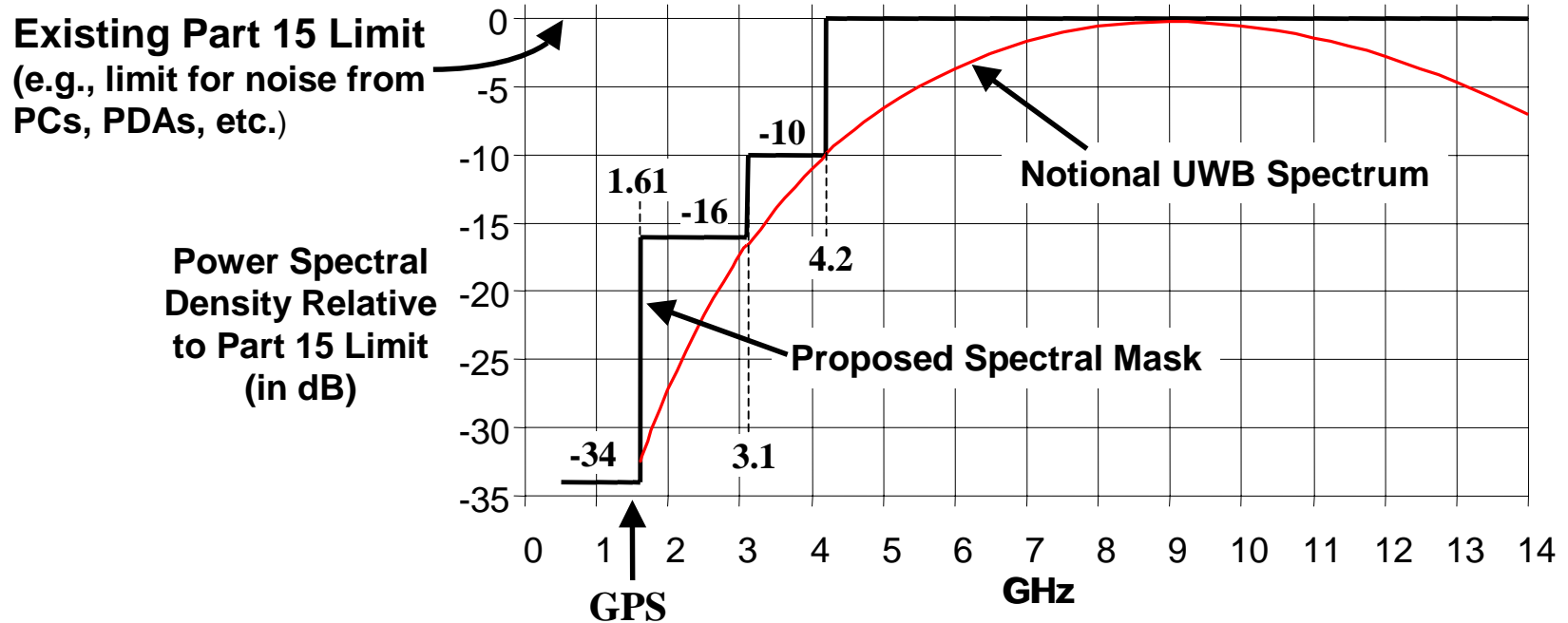
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- GPS can be completely protected with a deep notch
- RTCA's conservative analysis asked for  $-60$  dBm/MHz for noise and  $-70$  dBm/MHz for spectral lines
- GPSIC asked for  $-76.3$  dBm/MHz protection for spectral lines (4 times lower power than RTCA)
- The NTIA proposed (we understand)  $-75.3$  dBm/MHz
- XSI filed that it believed these were overly conservative but would not object
- The analysis shows that this level is exceedingly safe

**GPS can be protected from outdoor UWB devices, both at ground-level and elevated heights**

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# Proposed Spectral Mask Will Limit UWB Emissions in Sensitive Bands



- Limits UWB emissions to levels far below those proposed in the NPRM
- This proposal limits UWB emissions consistent with demands by all parties in the FCC proceeding, *including GPSIC and NTIA*



# *XtremeSpectrum Proposal*

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## ■ **Ban outdoor infrastructure for UWB**

- no fixed (non-mobile handheld) units outdoors

## ■ **Give manufacturers a choice of compliance options:**

- 1. Indoors - Operation at modified NPRM levels (-12 dB from Class-B below 2 GHz, -21 dB from Class-B in GPS band), or
- 2. Mobile peer-to-peer operation at greatly reduced emissions levels (see below) and only when affirmatively initiated by the user (i.e., no automatic peer-to-peer operation)

## ■ **For peer-to-peer operation under option (2)**

- we suggest the following emissions limits, which we understand have been proposed by NTIA for all UWB operation, including outdoors, which are considerably more stringent than the FCC's proposal:
  - 960-1610 MHz            34dB below Sec. 15.209(a) levels
  - 1610-3100 MHz        16dB below Sec. 15.209(a) levels
  - 3100-4200 MHz        10dB below Sec. 15.209(a) levels
  - Above 4200 MHz       Section 15.209(a) levels
  - *(While the record does not justify limits tighter than Sec. 15.209(a) values in the 3100-4200 MHz band, XtremeSpectrum will accept this limit if necessary to resolve a ban on peer-to-peer)*
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# *UWB Companies MUST have products that don't interfere*

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## ■ Good Business Practice

***UWB Manufacturers could not stay in business if their products interfered with other radio services***

## ■ UWB will coexist with GPS and PCS in portable devices

- Main Driver for Consumer Devices—Cell phones and PDAs
  - Networking capability is the driving force
  - UWB based networking cannot sacrifice connection to GPS and 3G
- Main Driver for National Security and Public Safety applications
  - GPS again.

# Technical Presentation Shows



- **No Peer-to-Peer Restrictions are needed**
  - **A Simple Restriction On Tower Mounted UWB Devices is Plenty**
    - Sound technical analysis supports that a spectral mask provides all the needed protection to allow UWB devices to operate outdoors.
- **Outdoor UWB at any height and scenario is safe for GPS**
  - Numerous reports and studies present a consistent picture of the interference mechanisms of UWB on GPS receivers
  - The 35 dB down from Class-B accomplishes the needed protection
- **Outdoor Class-B UWB at any height is safe for nearly all systems studied in NTIA report**
  - Assumptions that changed will be highlighted in following slides
- **Aggregation is not a factor**
  - Numerous reports and studies present a consistent picture showing the cumulative effects of multiple UWB devices are dominated by closest emitters
  - Experience from PC's is that aggregation is not an issue.
- **Emissions and Aggregation from a PC are representative**
  - UWB signals are similar from those of PC's and other typical radio signals.
  - If a device is not bothered by PC's, then it won't be bothered by UWB





XtremeSpectrum

# *XtremeSpectrum Summary*

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- **US has UWB lead. Expeditious action is required to ensure and protect US leadership in this innovative wireless technology.**
    - UWB simultaneously delivers high data rate and low power consumption at low cost to enable wireless media-intensive consumer electronics, security and public safety applications.
    - Government and public safety users will benefit from innovations, cost reductions and economies of scale of commercial applications.
  - **There is a world-wide effort growing fast**
  - **XtremeSpectrum has met all interference concerns raised in the docket.**
    - Good Business Practice – Customers demand full protection of other radio services, especially for functions in the same device.
    - A ban on peer-to-peer communications to enforce a total ban on outdoor use would significantly undercut utility, innovation and benefits to the economy.
  - **XtremeSpectrum does not seek rules that would hinder other manufacturers.**
    - The FCC should give manufacturers multiple regulatory options, each of which protects existing spectrum users
    - This maximizes opportunities for innovation and competition
-